63d Congress, 2d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1112.

2

COLUMBIA RIVER, WASH., FROM RICKEY (OR GRAND) RAPIDS TO INTERNATIONAL BOUNDARY LINE.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF COLUMBIA RIVER, WASH., FROM AND THROUGH RICKEY (OR GRAND) RAPIDS TO THE INTERNATIONAL BOUNDARY LINE, WITH A VIEW TO OPEN RIVER NAVIGATION.

July 7, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, July 6, 1914.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated July 3, instant, together with a copy of a report from Maj. J. B. Cavanaugh, Corps of Engineers, dated May 14, 1914, with maps, of a preliminary examination made by him in compliance with the provisions of the river and harbor act of July 25, 1912, of Columbia River, Wash.

Very respectfully,

Lindley M. Garrison,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, July 3, 1914.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Columbia River, Wash.

1. There is submitted herewith, for transmission to Congress, report dated May 14, 1914, by Maj. J. B. Cavanaugh, Corps of Engineers, on preliminary examination called for by the following item contained in the river and harbor act approved July 25, 1912:

> Columbia River, Wash., from and through Rickey and Grand Rapids to the international boundary line, with a view to open river navigation.

2. The section of river under consideration has a length of 48 miles and flows through a deep canyon. It has a steep slope, made up of a series of pools and rapids or falls, and is obstructed by dangerous rocks. Some places are impassable, and one of them, Kettle Falls, can not be made passable at any stage of the river by regulation. In view of the enormous cost of any practicable improvement and the small and doubtful benefit to commerce that would result therefrom, the district officer is of opinion that the improvement is not worthy of being undertaken by the United States at the present time. The division engineer concurs in this opinion.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated June 16, 1914, concurring in the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore report that the improvement by the United States of Columbia River, Wash., from and through Rickey (or Grand) Rapids to the international boundary line, with a view to open river navigation is not deemed advisable at the present time.

Dan C. Kingman,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
June 16, 1914.

To the Chief of Engineers, United States Army.

1. The following is submitted in review of the district officer's report on preliminary examination of Columbia River, Wash., from and through Rickey (or Grand) Rapids to the international boundary line, with a view to open river navigation.

2. The distance from Rickey (or Grand) Rapids to the international boundary line is 48 miles. This portion of the river flows through a deep canyon, has a very steep slope, is obstructed by numerous rocks and rapids, and has generally a very swift current. One of these obstructions, known as Kettle Falls, can not be made passable at any stage of the river by regulation. The fall at this rapids is 33 feet, and the fall at Grand Rapids is 20 feet. Kettle Falls City, having a population of about 500, is the chief town on this reach.

3. The district officer states that to put the river in a good condition for a commercially practicable through navigation from the international boundary line to below Grand Rapids would involve the construction of extensive canalization works or boat railways or other suitable means of passing boats from one level to another at several points, and the removal of many obstructive ledges and dangerous rocks. He quotes descriptive matter from a former report, from which a very good idea of the serious obstructions at the several rapids may be had.

4. There is at present no commerce on this reach of river, and the district officer states that his efforts to secure statistical data have not met with success, although such information was promised by local interests. In view of the enormous cost of any practicable

improvement and the small and doubtful benefit to commerce that would result therefrom, the district officer is of opinion that the locality is not worthy of improvement by the United States at the present time. The division engineer concurs in this view.

5. Interested parties were informed of the unfavorable tenor of the district officer's report and given an opportunity of submitting their views to the board, but no communications on the subject have been received.

6. It is clear from the information now in hand that it is impracticable to secure navigation over this reach of river at anything like justifiable cost. There is no navigation at present, and it seems doubtful if any extensive commerce would develop if the river were improved. The board therefore reports, in concurrence with the views of the district officer and the division engineer, that in its opinion it is not advisable at this time for the United States to undertake the improvement of the Columbia River from Rickey (or Grand) Rapids to the international boundary line.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF COLUMBIA RIVER, WASH.

United States Engineer Office,
Seattle, Wash., May 14, 1914.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of the Columbia River, Wash., from and through Rickey (or Grand) Rapids to the international boundary line, with a view to open river navigation.

1. In compliance with section 2 of the river and harbor act dated July 25, 1912, I have to submit the following report on the preliminary examination of Columbia River Wash., from and through Rickey (or Grand) Rapids to the international boundary line, with a view to open-river navigation, with map as required.

2. Previous examinations and surveys of the upper Columbia River are reported in Executive Document No. 238, Fifty-first Congress, first session; Executive Document No. 39, Fifty-second Congress, second session; House Document No. 440, Fifty-ninth Congress, second session; Senate Executive Document No. 186, Forty-seventh Congress, first session; Annual Report, Chief of Engineers, United States Army, for 1893, pages 3381 to 3399, inclusive.

3. The Columbia River crosses the international boundary line in longitude 117° 37′ west of Greenwich and flows in a southerly direction for 110 miles, then turning westward about the same distance forms the so-called "Big Bend" region. Rickey (or Grand) Rapids is situated 48 miles below the international boundary line. The data given on the maps herewith are from the original survey maps of 1891 and amendments and additions made in 1909 and 1910.

The portion of the river considered in the present examination flows through a deep canyon, the valley containing a large amount of rich bench land along both sides, and the adjacent hills being well timbered.

The Kettle River from the west and the Colville River from the east at 38 and 45 miles, respectively, from the international boundary line, are the only important tributaries of this section of the river, and both of them are unnavigable.

Measurements made during the 1891 survey above the mouth of the Okanogan River indicate a low-water flow of about 50,000 second-feet and a high-water flow of 300,000 second-feet.

The Columbia River in this reach has a very steep slope, made up of a series of pools and rapids or falls. The principal falls are at Little Dalles, Kettle Falls, and Grand Rapids, and the obstructions to navigation consist of these falls, numerous rapids, and dangerous rocks, and a generally swift current. Some of these places are impassable, and one of them, Kettle Falls, can not be made passable at any stage of the river by regulation. The obstructive character of other places can be lessened by the removal of rocks from the bed and sides of the river.

The stretch from the boundary to Kettle Falls has a fall of 1.973 feet per mile, but can be improved by regulation. At Kettle Falls there is a drop of 33 feet at low water, and 6 miles below it is Grand Rapids, with a fall of 20 feet, giving a total fall from the head of Kettle Falls to below Grand Rapids of 58 feet.

To put the river in a good condition for a commercially practicable through navigation from the international boundary line to below Grand (or Rickey) Rapids involves the construction of extensive canalization works or boat railways or other suitable means for passing boats from one level to another at several points and the removal of many obstructive ledges and dangerous rocks.

At the international boundary line the Columbia River is well suited to navigation and is at present navigated up to its source in Upper Columbia Lake. The Canadian Dominion Government has spent and is at present spending considerable money in improving this stretch of river.

4. From Annual Report of the Chief of Engineers, 1893, pages 3384 et seq., the following description of the obstructions in the Columbia River from the international boundary line through Grand Rapids is taken, with suggested method of treatment. No improvements, except partial removal of rock in Grand Rapids, have been made on this stretch of river since the time of the original survey in 1891, and conditions are still practically as described in the report of 1893.

Detail drawings of obstructions are shown on accompanying maps.

Twomile Rapids.—After leaving the boundary line the first obstruction met with is at Twomile Rapids. Here the channel is obstructed by three rocks and a reef jutting out from the left shore. The betterment of the river at this point involves the removal of these rocks and this reef, aggregating 70 cubic yards of rock, of which 30 cubic yards are under water and 40 are above water at ordinary stages.

Steamboat Rapids.—Seven miles below the boundary is an awkward place for boats. Here there is a large shoal area, about which the channel makes a sharp detour, and just below this is a jutting point of rock and 11 small rocks. There are in these rocks about 90 cubic yards of submerged rock which should be removed.

Sheep Creek Bend.—Nine miles below the boundary is a bad place in the river. This is a point where Sheep Creek comes in from the west and Deep Creek comes in from the east. Just before reaching a sharp bend in the river known as Sheep Creek Bend the navigable channel passes between two large rock islands, and in the middle a smaller rock stands, the removal of which is necessary for safety.

Just below the bend the channel hugs the right shore, but it is studded with small lone rocks, 13 of which require removal. All this work involves the removal of 230 cubic yards of rock, which at the ordinary stages would be submerged.

The Little Dalles.—The Little Dalles is 15 miles below the boundary. Here the Columbia forces its way through a confined channel studded with rocks. At the head of the Little Dalles the river is only 130 feet wide, and it continues narrow, though somewhat wider, for 2,000 feet.

While the problem of improving the Little Dalles to give practical navigation at dead low water is not difficult, it becomes seriously so at higher stages of the river. As the water in the river rises the engorgement produces more and more of a fall, until at extreme high water there is a fall of 20 feet. To make the river navigable at the low stage of the water involves the removal of 3,400 cubic yards of rock from the reef at the entrance, and from the rapid below the Little Dalles proper. But this would give but imperfect navigation at low-water stages only. The river from Steamboat Rapids down to and through the Little Dalles is very rapid.

To make the Little Dalles navigable at ordinary stages it will either be necessary to widen the channel by the removal of a vast amount of rock, or to supply some auxiliary, as a lock and dam, or boat railway.

Josephs Rapids.—These rapids are 25 miles below the boundary. At this place there are 9 rocks and 1 jutting reef to be removed, aggregating 135 cubic yards of rock under water and 500 cubic feet above water. Three miles below there is a cluster of 14 rocks, the removal of which would be desirable. This cluster of rocks aggregates 140 cubic yards under water.

Pingstone Rapids.—These rapids commence at a point 30 miles below the boundary, and are 2 miles in length. In this stretch there are 16 rocks to be removed, aggregating 180 cubic yards under water and 1,500 cubic yards above water. Through these rapids the current runs at a rate of 8 miles per hour when the river is at nearly low water.

Marcus Rapid.—This is 35 miles below the boundary and is short, with quiet water above and below. To benefit it the point of rock jutting out from the right shore and 23 rocks just below should be removed. These aggregate 700 cubic yards of rock under water.

Kettle Falls.—The next obstruction of the river is Kettle Falls, situated 41 miles down from the boundary. This is the most complete and absolute bar to navigation at all stages in the river. Kettle Falls consists of two falls, which are indicated on the plat.

At this point the river is separated into channels by Hayes Island. The left-hand channel is about 160 feet wide for the first half of its length and then narrows up very much, in one place to 50 feet. The lower half of its length is a cascade; the fall in this distance of three-fourths of a mile is equal to the principal fall in the main channel, which is 25 feet. This main fall of 25 feet in the principal channel is caused by a ledge of limestone rock extending from the island to the right shore a length of 380 feet. The lower fall is caused by a promontory jutting out from the left shore below the island and extending to within 65 feet of the right shore. The low-water height of this lower fall is 7 feet.

The total fall at high water is the same as at low water, but it is differently distributed. At high water the lower fall becomes greater than the upper fall on account of the engorgement of the river, caused by the jutting reef at the lower fall.

If it should ever be deemed of sufficient importance to the interests of commerce to improve Kettle Falls so that boats could make the passage, it could be very properly done by locating locks in the promontory or ledge which juts out from the left shore, and the continuation of which forms the lower fall, at the same time damming up the outlet of the river channel between Hayes Island and the left bank, and cleaning it out where necessary to give good passage.

The total lift which would be required in these locks from low water below the falls to high water above the falls would be 60 feet.

Grand Rapids.—Grand Rapids are situated 7 miles below Kettle Falls, and these, while of a different nature, are nearly as impassable at any stages of the water for steamboats.

Grand Rapids are situated 48 miles below the boundary. The length of the rapids is 3,000 feet, the average width 1,200 feet, and the fall 20 feet. The river here is studded with rocks, through and about which the water flows with great rapidity in a very violent manner.

To pass boats up these rapids would require either a dam and locks, a canal with locks, or a boat railway. On account of the proximity of Kettle Falls and Grand Rapids, a plan to pass both obstructions by a boat railway about 8¾ miles long suggests itself. There is a very good alignment for such a road along the left bank of the river.

5. The following summary of conditions affecting the improvement of the upper Columbia, taken from report in Executive Document No. 39, Fifty-second Congress, second session, is believed to be thoroughly sound:

> A pretty thorough knowledge of the river and a careful study of all transportation and economic questions connected with it convince me that this river can not, at least in the near future, become a through highway of commerce upon which will be transported the products from and supplies to the region drained by it. There are too many things against its ever occupying this high position in the world of commerce. These may be summarized as the obstructions, such as rapids and falls of greater or less magnitude, which can only be passed by expensive canals and locks, boat railways, or portage roads; the many lesser rapids, where auxiliary power or lining would be necessary; the generally swift currents, requiring a large amount of fuel to surmount combined with a lack of fuel and high cost of the same; the economic character of the country in the immediate vicinity of the river, which is of such a nature as to furnish or promise but little local business; the topographical character of the river and its immediate vicinity, which render it difficult to get to and from the fertile regions above it, for it must be remembered that the Columbia flows through a great canyon or depression from 2,000 to 3,000 feet and more below the general level of the country drained by it, and the dangers which boats must ever take in navigating many portions of its course. The function of the Columbia in this upper portion of its course in the commercial world is and will be, at any rate for many years, that certain portions of it will be navigated as feeders to railroads. As such, certain portions will be of great value, and can well receive the attention of the General Government.

6. *Railroads.*—A branch of the Great Northern Railway coming from Spokane follows down the valley of the Colville River to its

junction with the Columbia River and crosses the Columbia at Marcus, 39 miles below the international boundary line. From this point one railroad line follows the river to the international boundary line and thence to Nelson, British Columbia, on Kootenai Lake, and another line runs up the valley of Kettle River and westward to Republic and Oroville, Wash., connecting with the Canadian Pacific Railway. A branch line of the Northern Pacific Railway has been graded (but no rails laid or bridges built) from west of Spokane, Wash., northward down the valley of Hawk Creek to the big bend of the Columbia River at Peach, Wash., and thence up the left bank of the river to the mouth of Spokane River, 57 miles below Grand Rapids, and its ultimate completion and extension upstream to Grand Rapids and Kettle Falls is not improbable. Improvements at present under way will make the entire stretch of river from Grand Rapids to Peach safely navigable for 6-foot-draft steamers at low water. One boat, *The Enterprise,* now occasionally plies on this stretch of stream.

The portion of the Columbia from Marcus to the international boundary line is a link in the line of communication between the Canadian Pacific Railroad at Revelstoke and the Great Northern, Northern Pacific, and Union Pacific Railroads at Spokane and incidentally by means of the Columbia & Kootenai Railroad with the Kootenai Lake and the Great Northern Railroad at Bonners Ferry, but its importance has been lessened in recent years by the construction of parallel railroads.

From Marcus northward to the international boundary line the territory tributary to the Columbia River is served by two railroad lines, one along the east bank of the river from Marcus to Nelson, British Columbia, and the other from Marcus up the valley of the Kettle River westward to Republic and Oroville. From Marcus south to Grand Rapids, 10 miles, a fine stretch of bench-land country is at present highly cultivated and must haul its produce out of the valley by a steep wagon road to the nearest railway station, at Meyers Falls, 4½ miles from Kettle Falls City. All of the Columbia River Valley, from Grand Rapids southward as far as the Spokane River, must haul its produce a distance of 15 to 45 miles up grade to the nearest railroad. To reach the plateau or table-land from the valley, the roads overcome a height of 1,500 to 3,000 feet in 4 to 10 miles.

7. *Resources.*—The chief products of the Columbia River Valley from Grand Rapids northward to the international boundary line are fruits and a medium quality of timber in the lowlands; cattle and a considerable quantity of grain and hay on the uplands. The Kettle River, on the east bank, and the Colville River, on the west bank, are used for irrigating the bench lands.

Kettle Falls City is the chief town in this vicinity and has about 500 inhabitants.

There is at present no commerce on the section of the Columbia River under consideration, and in view of the heavy expense of operating boats in such swift water it is not believed that any traffic other than that originating at Kettle Falls City would be diverted from the railroad even if the river were improved.

To learn the desires of interested parties regarding improvements to navigation on the upper Columbia River, a public hearing was held at Kettle Falls City on February 7, 1913. This hearing was attended by the chamber of commerce and most of the prominent citizens of Kettle Falls and vicinity. It was clearly stated that the present policy of the Government toward river improvement work was favorable to improvements only when the volume of present and reasonably prospective commerce warranted the expenditure as a good business venture. Local interests, recognizing the fact that improving the entire stretch of river from and through Grand Rapids to the international boundary line would entail a prohibitive expense when compared with the existing and immediately prospective commerce, expressed a desire to have an open river suitable for navigation through Rickey (or Grand) Rapids up to Kettle Falls City, so that produce might be taken southward from this point to the new railroad which is projected to a terminus at Lincoln, north of the mouth of the Spokane River. Information was requested by the district engineer regarding the products of the country, existing and prospective tonnage for river transportation, and upon other facts and considerations affecting the advisability of the improvement desired. Lists of questions, sample reports containing similar data, and every assistance were furnished to the Chamber of Commerce of Kettle Falls City, which promised to supply information as to commerce and commercial conditions. Repeated inquiries up to the present time have failed to secure any additional information regarding the upper Columbia River Valley, and therefore no such information can be submitted with this report.

8. *Terminal facilities.*—There are no terminal facilities. Landings are made alongside the banks. No terminal facilities are needed.

9. *Flood control, water power, etc.*—No questions of flood control or land reclamation enter into consideration in this report. Since there are valuable water powers in this stretch of river, supervision over any dams to be authorized should be exercised by the United States, with a view to lessening the cost of any needed locks or works for navigation.

10. *Recommendations.*—In view of the enormous cost of any practicable improvement for open-river navigation of the Columbia River from and through Rickey Rapids to the international boundary line, and the small and doubtful benefit to commerce that would result therefrom, I am of the opinion that the improvement is not worthy of being undertaken by the United States at the present time.

J. B. CAVANAUGH,
Major, Corps of Engineers.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
Portland, Oreg., May 18, 1914.

TO CHIEF OF ENGINEERS:

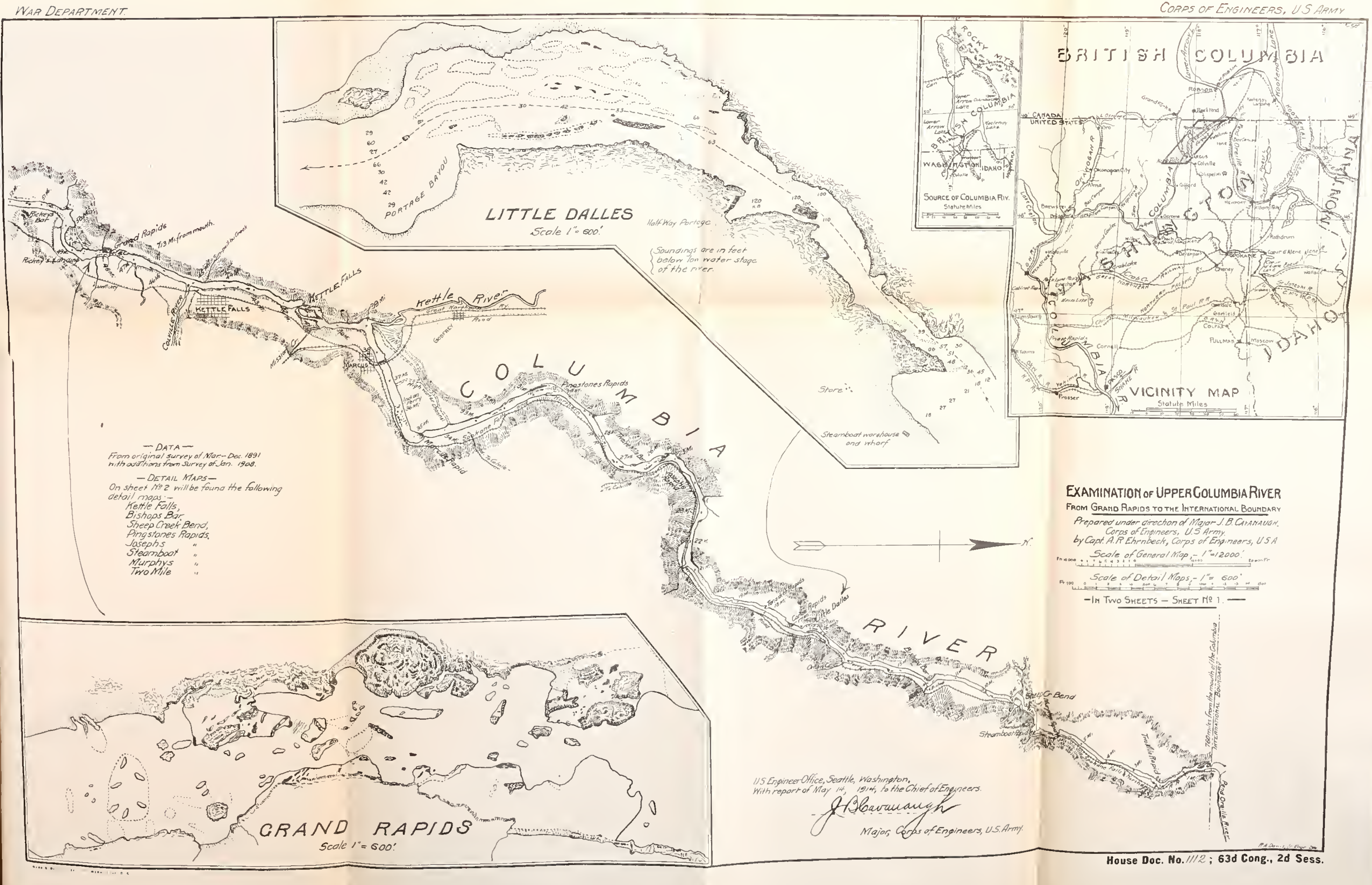
Forwarded, concurring with the recommendations made in paragraph 10 by the district officer.

C. H. MCKINSTRY,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For Report of the Board of Engineers for Rivers and Harbors see page 2.]

○

WAR DEPARTMENT. CORPS OF ENGINEERS, U.S. ARMY



— DATA —
From original survey of Mar.–Dec. 1891
with additions from Survey of Jan. 1908.

— DETAIL MAPS —
On sheet № 2 will be found the following
detail maps:–
Kettle Falls,
Bishops Bar,
Sheep Creek Bend,
Pingstones Rapids,
Josephs "
Steamboat "
Murphys "
Two Mile "

EXAMINATION OF UPPER COLUMBIA RIVER
FROM GRAND RAPIDS TO THE INTERNATIONAL BOUNDARY

Prepared under direction of Major J. B. Cavanaugh,
Corps of Engineers, U.S. Army,
by Capt. A. R. Ehrnbeck, Corps of Engineers, U.S.A.

Scale of General Map, – 1" = 12000'.

Scale of Detail Maps, – 1" = 600'

— IN TWO SHEETS — SHEET № 1. —

U.S. Engineer Office, Seattle, Washington.
With report of May 14, 1914, to the Chief of Engineers.
J. B. Cavanaugh
Major, Corps of Engineers, U.S. Army.

House Doc. No. 1112; 63d Cong., 2d Sess.